

DECLARATION

I, Takao MARUYAMA, a Japanese Patent Attorney registered No. 8425, having my business office at SAM Bldg., 38-23, Higashi-Ikebukuro 2-chome, Toshima-ku, Tokyo 170-0013, Japan, solemnly and sincerely declare that I have a thorough knowledge of Japanese and English languages, that I made an English translation attached hereto, and that to the best of my knowledge and belief the translation is a true and correct reproduction of the original documents filed with the Japanese Patent Office in respect of Japanese Patent Application No. 2002-316623 on October 30, 2002 in the name of NEC AccessTechnica, Ltd.

Signed this 18th day of January, 2006

A handwritten signature in black ink, appearing to read 'Takao Maruyama', is written over a horizontal line.

Takao Maruyama

Patent Attorney

JAPAN PATENT OFFICE

This is to certify that the annexed is a true copy of
the following application as filed with this Office.

Date of Application: October 30, 2002

Application Number: Patent Application No. 2002-316623

[ST. 10/C]: [JP2002-316623]

Applicant(s): NEC AccessTechnica, Ltd.

September 30, 2003

Commissioner, Yasuo Imai

Japan Patent Office

(Seal)

Certificate No. 2003-3080026

[Title of Document] Request for Patent

[Reference Number] 01703248

[Submitting date] October 30, 2002

[Address]

To Honorable Commissioner of the Patent Office

[International Classification] G03B 15/00

H05B 39/00

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[Indication of Charge]

[Ledger Number of Payment in Advance] 007250

[Amount of Payment] 21000

[List of Objects Submitted]

[Title of Object] Specification 1

[Title of Object] Drawings 1

[Title of Object] Abstract 1

[Number of Inclusive Power of Attorney]

9715044

[Necessity of Proof]

Necessity

[Title of Document]

Specification

[Title of the Invention]

MOBILE PHONE WITH ILLUMINATOR, ILLUMINATOR
5 CONTROL METHOD AND ILLUMINATOR CONTROL
PROGRAM THEREOF

[Scope of Claim for a Patent]

[Claim 1] A mobile phone with illuminator, comprising:

a shooting means for shooting an image;

10 a light emitting means for emitting light to illuminate a subject
when shooting an image;

an operation inputting means from which a user inputs
information to operate the mobile phone; and

a control means for controlling the respective means,

15 wherein the control means controls the light emitting means to
continuously emit light for a designated time while a moving image is
being shot so that a time length for emitting light varies depending on
whether a still image or a moving image is shot.

[Claim 2] The mobile phone with illuminator claimed in claim 1,
20 wherein when an operation to activate the light emitting means is
performed while the shooting means is not active, the control means
controls the light emitting means to continuously emit light until a
predetermined operation is performed.

[Claim 3] The mobile phone with illuminator claimed in claim 2,
25 wherein the control means controls the light emitting means to emit light
so that the intensity of illumination thereof at the time of continuous
lighting is lower than the intensity of illumination thereof at the time of
image shooting.

[Claim 4] The mobile phone with illuminator claimed in claim 3,
30 wherein:

the light emitting means comprises a plurality of light emitting diodes; and

the control means controls the number of the light emitting diodes to emit light so that the intensity of illumination of the light emitting means at the time of the continuous lighting is lower than the intensity of illumination of the light emitting means at the time of image shooting.

[Claim 5] An illuminator control method for a mobile phone with illuminator comprising: a shooting means for shooting an image; a light emitting means for emitting light to illuminate a subject when shooting an image; and an operation inputting means from which a user inputs information to operate the mobile phone, comprising: the first control step of controlling the light emitting means to continuously emit light for a designated time while a moving image is being shot so that a time length for emitting light varies depending on whether a still image or a moving image is shot.

[Claim 6] The illuminator control method claimed in claim 5, comprising the second control step of, when an operation to activate the light emitting means is performed while the shooting means is not active, controlling the light emitting means to continuously emit light until a predetermined operation is performed.

[Claim 7] The illuminator control method claimed in claim 6, comprising the third control step of controlling the light emitting means to emit light so that the intensity of illumination thereof at the time of continuous lighting is lower than the intensity of illumination thereof at the time of image shooting.

[Claim 8] The illuminator control method claimed in claim 7, wherein:

the light emitting means comprises a plurality of light emitting diodes; and

in the third control step, the number of the light emitting diodes to emit light is controlled so that the intensity of illumination of the light emitting means at the time of continuous lighting is lower than the intensity of illumination of the light emitting means at the time of image shooting.

[Claim 9] An illuminator control program for a mobile phone with illuminator comprising: a shooting means for shooting an image; a light emitting means for emitting light to illuminate a subject when shooting an image; and an operation inputting means from which a user inputs information to operate the mobile phone, performing the process of:

controlling the light emitting means to continuously emit light for a designated time while a moving image is being shot so that a time length for emitting light varies depending on whether a still image or a moving image is shot.

[Claim 10] The illuminator control program claimed in claim 9, when an operation to activate the light emitting means is performed while the shooting means is not active, performing the process of controlling the light emitting means to continuously emit light until a predetermined operation is performed.

[Claim 11] The illuminator control program claimed in claim 10, performing the process of controlling the light emitting means to emit light so that the intensity of illumination thereof at the time of continuous lighting is lower than the intensity of illumination thereof at the time of image shooting.

[Claim 12] The illuminator control program claimed in claim 11, wherein the light emitting means comprises a plurality of light emitting diodes, the program performing the process of:

controlling the number of the light emitting diodes to emit light so that the intensity of illumination of the light emitting means at the time of continuous lighting is lower than the intensity of illumination of

the light emitting means at the time of image shooting.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

5 The present invention relates to a mobile phone with illuminator having an image shooting device for transmitting image information such as a self-portrait to a receiver, an illuminator control method and an illuminator control program thereof, and in particular, to a mobile phone with illuminator having a lighting function to illuminate a subject when
10 shooting an image, an illuminator control method and an illuminator control program thereof.

[0002]

[Prior Art]

 Small and lightweight mobile terminal devices have become
15 widely used in tandem with the advances of communication technology and semiconductor technology. Further, along with the popularization of the mobile terminal devices, the performance is increasingly improved to fulfill the requirements from users. For example, a mobile terminal device with an image shooting device such as a digital camera, which has
20 an image-information transmitting and receiving function in addition to a conventional voice-information and text-information transmitting and receiving function, has been developed and practically used.

[0003]

 When a picture is taken with the mobile terminal device with a
25 digital camera to be transmitted to a receiver, it is often the case that a sender (user) shoots his/her face or figure (self-portrait) to transmit. Accordingly, they can identify the other party by the image while communicating with each other.

[0004]

30 An example of a conventional mobile phone is disclosed in the

following patent document 1.

[0005]

[Patent Document 1]

Japanese Patent Application laid-open No. 2001-320461

5 [0006]

The mobile phone disclosed in the patent document 1, as shown in Fig. 3, has a main body 10 of thin box size to be easily carried on, in the internal space of which, one or more lighting light emitting diodes 11 each with its light emitting section being exposed to the outside are placed at proper places, an input terminal of the lighting light emitting diode 11 is connected to a direct current power supply unit so that the diode 11 can be turned on by wiring, a switch circuit for turning on and off the lighting light emitting diode 11 is incorporated partway along the wiring circuit, and an opening and closing operation button 12 for the switch circuit is disposed at a proper place of the main body to be exposed to the outside.

[0007]

[Problems that the Invention is to Solve]

As mentioned above, a mobile phone with a digital camera capable of taking pictures and shooting moving images is getting popularized, and accordingly, a technique for taking pictures and shooting moving images in the dark is required. When a mobile phone is provided with a lighting function, it has become necessary for the mobile phone to be capable of not only conventional flash photography but also shooting moving images in the dark.

[0008]

It is therefore an object of the present invention to provide a mobile phone with illuminator capable of shooting not only still images but also moving images in the dark, an illuminator control method and an illuminator control program thereof.

[0009]

It is another object of the present invention to provide a mobile phone with illuminator capable of illuminating the dark by continuously emitting light even when not shooting images, an illuminator control
5 method and an illuminator control program thereof.

[0010]

[Means of Solving Problems]

According to the first aspect of the present invention, for achieving the objects mentioned above, there is provided a mobile phone
10 with illuminator, comprising: a shooting means for shooting an image; a light emitting means for emitting light to illuminate a subject when shooting an image; an operation inputting means from which a user inputs information to operate the mobile phone; and a control means for controlling the respective means, wherein the control means controls the
15 light emitting means to continuously emit light for a designated time while a moving image is being shot so that a time length for emitting light varies depending on whether a still image or a moving image is shot.

[0011]

20 According to the second aspect of the present invention, in the first aspect, when an input operation to activate the light emitting means is performed while the shooting means is not active, the control means controls the light emitting means to continuously emit light until a predetermined operation is performed.

25 [0012]

According to the third aspect of the present invention, in the second aspect, the control means controls the light emitting means to emit light so that the intensity of illumination thereof at the time of continuous lighting is lower than the intensity of illumination thereof at
30 the time of image shooting.

[0013]

According to the fourth aspect of the present invention, in the third aspect, the light emitting means comprises a plurality of light emitting diodes, and the control means controls the number of the light emitting diodes to emit light so that the intensity of illumination of the light emitting means at the time of continuous lighting is lower than the intensity of illumination of the light emitting means at the time of image shooting.

[0014]

According to the fifth aspect of the present invention, there is provided an illuminator control method for a mobile phone with illuminator comprising: a shooting means for shooting an image; a light emitting means for emitting light to illuminate a subject when shooting an image; and an operation inputting means from which a user inputs information to operate the mobile phone, comprising the first control step of controlling the light emitting means to continuously emit light for a designated time while a moving image is being shot so that a time length for emitting light varies depending on whether a still image or a moving image is shot.

[0015]

According to the sixth aspect of the present invention, in the fifth aspect, the method comprises the second control step of, when an operation to activate the light emitting means is performed while the shooting means is not active, controlling the light emitting means to continuously emit light until a predetermined operation is performed.

[0016]

According to the seventh aspect of the present invention, in the sixth aspect, the method comprises the third control step of controlling the light emitting means to emit light so that the intensity of illumination thereof at the time of continuous lighting is lower than the

intensity of illumination thereof at the time of image shooting.

[0017]

According to the eighth aspect of the present invention, in the seventh aspect, wherein the light emitting means comprises a plurality of light emitting diodes, and in the third control step, the number of the light emitting diodes to emit light is controlled so that the intensity of illumination of the light emitting means at the time of continuous lighting is lower than the intensity of illumination of the light emitting means at the time of image shooting.

[0018]

According to the ninth aspect of the present invention, there is provided an illuminator control program for a mobile phone with illuminator comprising: a shooting means for shooting an image; a light emitting means for emitting light to illuminate a subject when shooting an image; and an operation inputting means from which a user inputs information to operate the mobile phone, performing the process of controlling the light emitting means to continuously emit light for a designated time length while a moving image is being shot so that a time length for emitting light varies depending on whether a still image or a moving image is shot.

[0019]

According to the tenth aspect of the present invention, in the ninth aspect, the program performs the process of, when an input operation to activate the light emitting means is performed while the shooting means is not active, controlling the light emitting means to continuously emit light until a predetermined operation is performed.

[0020]

According to the eleventh aspect of the present invention, in the tenth aspect, the program performs the process of controlling the light emitting means to emit light so that the intensity of illumination thereof

at the time of continuous lightning is lower than the intensity of illumination thereof at the time of image shooting.

[0021]

According to the twelfth aspect of the present invention, in the eleventh aspect, the light emitting means comprises a plurality of light emitting diodes, the program performs the process of controlling the number of the light emitting diodes to emit light so that the intensity of illumination of the light emitting means at the time of continuous lighting is lower than the intensity of illumination of the light emitting means at the time of image shooting.

[0022]

[Embodiment of the Invention]

Referring now to the drawings, a detailed description will be given of a mobile phone with illuminator, an illuminator control method and an illuminator control program thereof according to an embodiment of the present invention. Figs. 1 and 2 show an embodiment of a mobile phone with illuminator, an illuminator control method and an illuminator control program thereof in accordance with the present invention.

[0023]

First, referring to Fig. 1, an explanation will be given of a circuitry of a mobile phone with illuminator according to an embodiment of the present invention.

As shown in Fig. 1, the mobile phone with illuminator of this embodiment comprises a camera module 1, a camera module control LSI (Large Scale Integration) 2, a CPU (Central Processing Unit) 3, a DC/DC converter 5, a light emitting section 4 and a display 6. The camera module 1 comprises a sensor for shooting images, a DSP (Digital Signal Processor) for performing digital conversion, and a control circuit. The camera module control LSI 2 controls the camera module 1, image

expanding and compressing processes, display by the display device, and the like. The CPU 3 controls the whole mobile phone device. The DC/DC converter 5 drives the light emitting section 4. The light emitting section 4 has a plurality of light emitting diodes. The display 6 comprises an LCD (Liquid Crystal Display) and the like.

[0024]

In the following, an explanation will be given of an appearance of the mobile phone of this embodiment with reference to Fig. 2, and in addition, the operation procedure of the mobile phone of this embodiment.

As shown in Fig. 2, in this embodiment, the light emitting section 4 is mounted on the back surface (the opposite side of the display) of the upper body of the mobile phone toward the same direction as the camera module 1. When the light emitting diodes are lighting, the light is diffused in the directions as shown by the broken lines in Fig. 2 to illuminate a subject.

[0025]

When the camera is active, the CPU 3 controls the DC/DC converter 5 according to an image (still or moving image) shot by the camera module 1, and controls ON/OFF operation of the light emitting section 4.

[0026]

In other words, when shooting a still image in the dark, the CPU 3 controls the light emitting section 4 to turn on the light emitting diodes for the most suitable time length. On the other hand, when a moving image is shot, the CPU 3 controls the light emitting section 4 so that the light emitting diodes continuously emit light according to the shooting time.

[0027]

A user has only to set ON/OFF state of the camera illuminator

(key input by following the instructions displayed on the display 6) to make the illuminator emit light for a predetermined time according to the time length suitable for shooting a still or moving image. For instance, when a still image is shot, the light emitting section 4 emits light for approximately one second, and when a moving image is shot, the light emitting section 4 continuously emits light over a few seconds to several dozen seconds.

[0028]

The light emitting diodes in the light emitting section 4 are turned off in any one of the cases where one minute has passed with the light emitting diodes in ON state, a shooting has finished, and an exit operation has been performed.

[0029]

Moreover, for the use of the mobile phone as a flashlight in the dark while the camera is not active, a user turns ON/OFF the continuous lighting setting (key input by following the instructions displayed on the display 6). Accordingly, the light emitting diodes continuously emit light for the use of a flashlight. Based on the ON/OFF control, the CPU 3 controls the DC/DC converter 5 and the ON/OFF state of the light emitting section 4.

[0030]

For example, a user may turn on the light emitting diodes by continuously pushing a predetermined key for a predetermined time with the mobile phone in standby mode. Further, while the light emitting section 4 is emitting light, this may be indicated on a main screen of the display 6. Moreover, the light emitting diodes may be turned off in any one of the cases where: any one of the keys is pushed while the light emitting diodes are lighting; the body of the mobile phone is folded while the light emitting diodes are lighting; the other event (such as reception of an incoming call) occurs while the light emitting diodes are lighting;

and the like.

[0031]

Incidentally, when the mobile terminal is used as a flashlight, because the lower intensity of illumination may be needed as compared to that when an image is shot, the power consumption can be reduced by changing the output from the DC/DC converter 5.

[0032]

As another means to reduce electricity consumption, while all of the light emitting diodes are turned on when the camera is used for shooting images, the number of the light emitting diodes to be turned on may be reduced when the light is continuously emitted without using the camera. For example, a total of 4 light emitting diodes (2 diodes + 2 diodes) may be turned on when the camera is used, and only 2 diodes may be turned on when the camera is not used.

[0033]

As described hereinbefore, according to this embodiment, when a user sets the light of the light emitting section 4 to ON when using the camera, the light emitting section 4 can be controlled to illuminate a subject for the most suitable time length regardless of whether a still image or a moving image is shot. Accordingly, it becomes possible to suitably shoot an image in the dark.

[0034]

Additionally, the mobile phone may be used as a flashlight by making the illuminator continuously emit light which is normally used for shooting an image, and accordingly, it becomes possible to obtain a light easily, for example, when a user checks a keyhole or searches for something in the dark.

[0035]

Further, the light emitting section 4 may be controlled so that the intensity of illumination thereof when used as a flashlight becomes lower

than the intensity of illumination thereof when the camera is used, and therefore, it becomes possible to reduce power consumption by the mobile phone.

[0036]

5 Incidentally, a preferred embodiment of the present invention has been described. However, the present invention is not to be restricted by the embodiment, and modifications and variations can be made without departing from the spirit and scope of the present invention.

10 [0037]

[Effect of the Invention]

As set forth hereinbefore, according to the present invention, the control means controls the light emitting means to continuously emit light for a predetermined time while a moving image is shot, and
15 therefore a time length for emitting light can be controlled to change depending on whether a still image or a moving image is shot. Accordingly, the light emitting means is controlled to illuminate a subject for an optimum time regardless of whether a still image or a moving image is shot, and therefore, it becomes possible to suitably shoot
20 an image in the dark.

[0038]

Moreover, when a user operates the mobile phone to activate the light emitting means while the camera is not active, the light emitting means is controlled to continuously emit light until a predetermined
25 input operation is performed. Accordingly, the mobile phone may be used as a flashlight, for example, when a user checks a keyhole or searches for something in the dark.

[0039]

Furthermore, the light emitting means is controlled so that the
30 intensity of illumination thereof at the time of continuous lighting is

lower than the intensity of illumination thereof at the time of image shooting. Accordingly, it becomes possible to reduce power consumption by the light emitting means.

[Brief Description of the Drawings]

5 [Fig. 1]

A block diagram showing the structure of a mobile phone with illuminator according to an embodiment of the present invention.

[Fig. 2]

10 A diagram showing an appearance of the mobile phone with illuminator according to the embodiment of the present invention.

[Fig. 3]

An external view showing the structure of a conventional mobile phone.

[Description of Code]

- | | | |
|----|---|------------------------|
| 15 | 1 | Camera module |
| | 2 | Camera control LSI |
| | 3 | CPU |
| | 4 | Light emitting section |
| | 5 | DC/DC converter |
| 20 | 6 | Display |

[Title of Document]

Abstract

[Abstract]

[Problem] To provide a mobile phone with illuminator capable of shooting not only a still image but also a moving image in the dark.

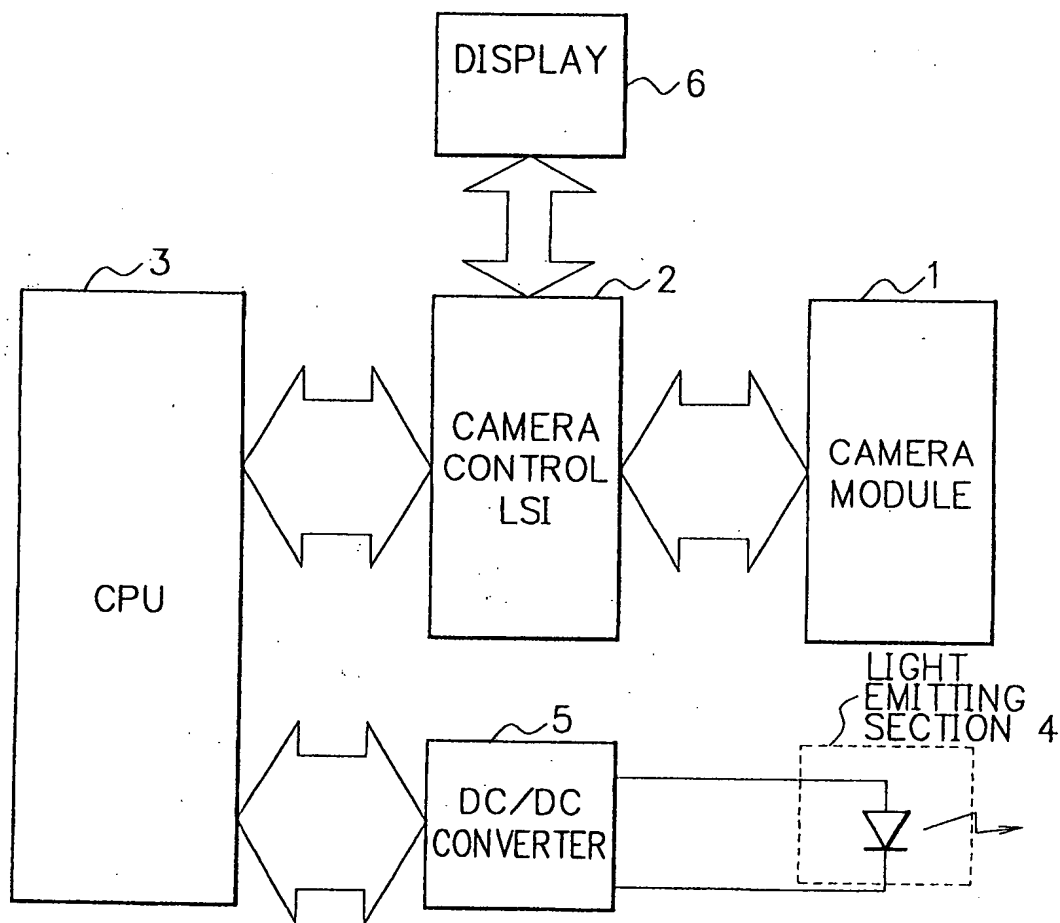
[Means for Solving] When a user sets the light of a light emitting section 4 to ON at the time of using a camera, the light emitting section 4 is controlled to emit light for the most suitable time for shooting regardless of whether a still image or a moving image is shot.

Accordingly, it becomes possible to shoot an image in the dark successfully. Moreover, the mobile phone can be used as a flashlight by making its illuminator continuously emit light that is used when an image is shot, and accordingly, it becomes possible to obtain a light easily, for example, when the user checks a keyhole or searches for something in the dark.

[Selected Drawing] Fig. 1



F I G. 1



F I G. 2

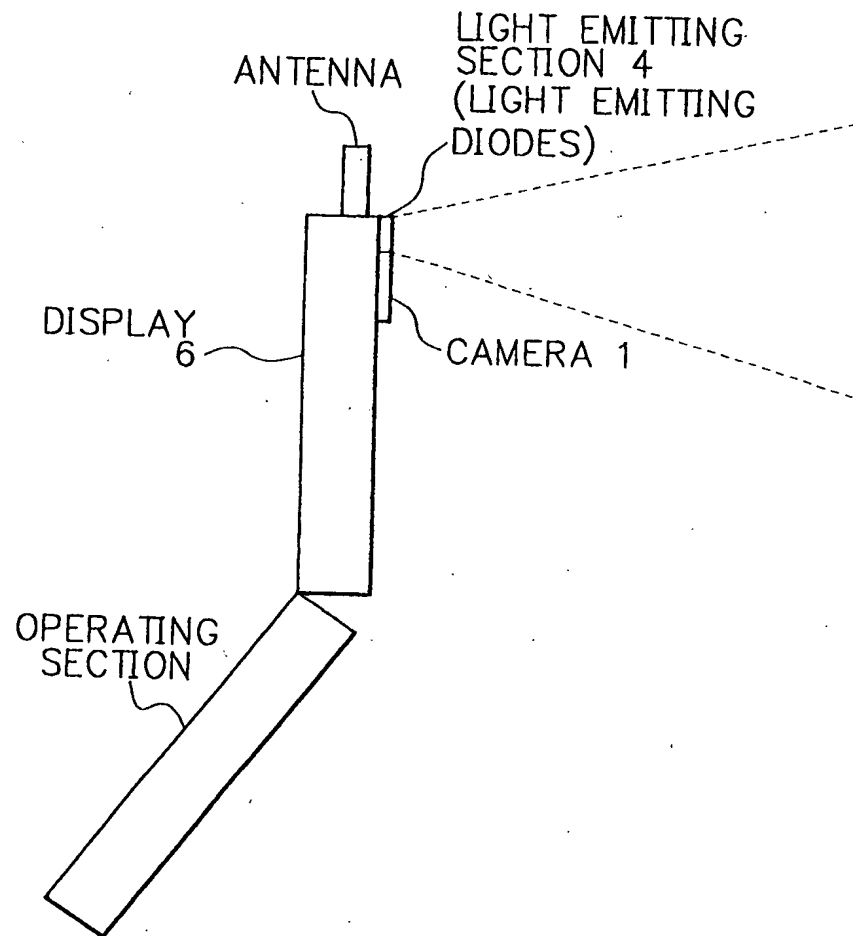


FIG. 3

